

## Board Administration and Regulatory Coordination Unit

### Division 3. Air Resources Board

#### Chapter 1. Motor Vehicle Pollution Control Devices

##### Article 2. Approval of Motor Vehicle Pollution Control Devices (New Vehicles)

###### § 1956.8. Exhaust Emissions Standards and Test Procedures-1985 and Subsequent Model Heavy-Duty Engines and Vehicles.

(a)(1) The exhaust emissions (i) from new 1985 through 2003 model heavy-duty diesel engines (except methanol-fueled engines), and heavy-duty natural-gas-fueled and liquefied-petroleum-gas-fueled engines derived from diesel-cycle engines, and (ii) from all new 1993 through 2003 model heavy-duty methanol-fueled, diesel engines, except in all cases engines used in medium-duty vehicles, shall not exceed:

Exhaust Emission Standards For 1985-2003 Model Heavy-Duty Engines Other than Urban Bus Engines (grams per brake horsepower-hour [g/bhp-hr])					
Model Year	Total Hydrocarbons or OMHCEA	Optional Non-methane Hydrocarbons <sup>A</sup>	Carbon Monoxide	Oxides of Nitrogen	Particulates
1985-1986	1.3		15.5	5.1	--
1987 <sup>B</sup>	1.3		15.5	5.1	--
1988-1989	1.3		15.5	6.0	0.60
1990	1.3	1.2	15.5	6.0	0.60
1991-1993 <sup>C</sup>	1.3	1.2	15.5	5.0	0.25 <sup>D</sup>
1994-1997	1.3	1.2	15.5	5.0	0.10 <sup>D</sup>
1995-1997 <sup>E</sup>	1.3	1.2	15.5	3.5 to 0.5	0.10
1998-2003 <sup>F</sup>	1.3	1.2	15.5	4.0 <sup>G,H</sup>	0.10 <sup>G</sup>
1998-2003 <sup>E</sup>	1.3	1.2	15.5	2.5 to 0.5 <sup>I</sup>	0.10

<sup>A</sup> The total or optional non-methane hydrocarbon standards apply to petroleum-fueled, natural-gas-fueled and liquefied-petroleum-gas-fueled engines. The Organic Material Hydrocarbon Equivalent, or OMHCE, standards apply to methanol-fueled engines.

<sup>B</sup> As an option a manufacturer may elect to certify to the 1988 model-year emission standards one year early, for the 1987 model year.

<sup>C</sup> For methanol-fueled engines, these standards shall be applicable beginning with the 1993 model year.

<sup>D</sup> Emissions averaging may be used to meet this standard. Averaging is restricted to within each useful life subclass and is applicable only through the 1995 model year. Emissions from engines used in urban buses shall not be included in the averaging program.

<sup>E</sup> These are optional standards. A manufacturer may elect to certify to an optional NOx standard between the values, inclusive, by 0.5 grams per brake horsepower-hour increments. Engines certified to any of these optional NOx standards are not eligible for participation in any averaging, banking or trading programs described in "California Exhaust Emission Standards and Test Procedures for 1985 and Subsequent Model Heavy-Duty Diesel Engines and Vehicles" incorporated by reference in (b), below.

<sup>F</sup> These are mandatory standards.

<sup>G</sup> Engines of 1998 through 2003 model years may be eligible to generate banking credits based on these standards according to the requirements of the averaging, banking and trading programs described in "California Exhaust Emission Standards and Test Procedures for 1985 and Subsequent Model Heavy-Duty Diesel Engines and Vehicles" incorporated by reference in (b), below.

<sup>H</sup> May be used as the certification standard for the higher emitting fueling mode of an engine certified under the dual fueling mode certification process of (a)(3)(4), below.

<sup>I</sup> May be used as the certification standard for the lower emitting fueling mode of an engine certified under the dual fueling mode certification process of (a)(3)(4), below.

(2) The exhaust emissions from new 2004 and subsequent model heavy-duty diesel engines, heavy-duty natural gas-fueled and liquefied-petroleum-gas-fueled engines derived from diesel-cycle engines, and heavy-duty methanol-fueled diesel engines, and the optional, reduced-emission standards for 2002 and subsequent model engines produced beginning October 1, 2002, except in all cases engines used in medium-duty vehicles, shall not exceed:

Exhaust Emission Standards for 2004 and Subsequent Model Heavy-Duty  
Engines, and Optional, Reduced Emission Standards for 2002 and Subsequent  
Model Heavy-Duty Engines Produced Beginning October 1, 2002,  
Other than Urban Bus Engines  
(grams per brake horsepower-hour [g/bhp-hr])

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<i>Model Year</i>	<i>Oxides of Nitrogen Plus Non-methane Hydrocarbons</i>	<i>Optional Oxides of Nitrogen Plus Non-methane Hydrocarbons</i>	<i>Carbon Monoxide Matter</i>	<i>Particulates</i>
2004 and subsequent <sup>H</sup>	2.4 <sup>A,C,E</sup>	2.5 <sup>B,C,E</sup>	15.5	0.10 <sup>C</sup>
October 1, 2002 and subsequent	n/a	1.8 to 0.3 <sup>A,D,F</sup>	15.5	0.03 to 0.01 <sup>G</sup>

<sup>A</sup>This is the standard for the arithmetic sum of the oxides of nitrogen exhaust component certification value and the non-methane hydrocarbon exhaust component certification value, without individual restriction on the individual component values.

<sup>B</sup>This is the standard for the arithmetic sum of the oxides of nitrogen exhaust component certification value and the non-methane hydrocarbon exhaust component certification value, with the non-methane hydrocarbon individual component value not to exceed 0.5 g/bhp-hr.

<sup>C</sup>Emissions averaging may be used to meet this standard. Averaging must be based on the requirements of the averaging, banking and trading programs described in "California Exhaust Emission Standards and Test Procedures for 1985 and Subsequent Model Heavy-Duty Diesel Engines and Vehicles" incorporated by reference in (b), below.

<sup>D</sup>A manufacturer may elect to certify to an optional reduced-emission NOx+NMHC standard between the values, inclusive, by 0.3 grams per brake horsepower-hour increments. Engines certified to any of these optional reduced-emission NOx standards are not eligible for participation in any averaging, banking or trading programs described in "California Exhaust Emission Standards and Test Procedures for 1985 and Subsequent Model Heavy-Duty Diesel Engines and Vehicles" incorporated by reference in (b), below.

<sup>E</sup>May be used as the certification standard for the higher emitting fueling mode of an engine certified under the dual fueling mode certification process of (a)(4), below.

<sup>F</sup>May be used as the certification standard for the lower emitting fueling mode of an engine certified under the dual fueling mode certification process of (a)(4), below.

<sup>G</sup>A manufacturer may elect to certify to an optional reduced-emission PM standard between the specified values, inclusive, by 0.01 grams per brake horsepower-hour increments. Engines certified to any of these optional reduced-emission PM standards are not eligible for participation in any averaging, banking or trading programs described in "California Exhaust Emission Standards and Test Procedures for 1985 and Subsequent Model Heavy-Duty Diesel Engines and Vehicles" incorporated by reference in section 1956.8(b), below.

<sup>H</sup>Engine manufacturers subject to the Heavy-Duty Diesel Engine Settlement Agreements (Settlement Agreements) must produce engines in compliance with the requirements contained in their respective Settlement Agreement. Most engine manufacturers subject to the Settlement Agreements are required to manufacture engines meeting the exhaust emission standards for 2004 and subsequent model years engines beginning October 1, 2002.

Seven of the largest heavy-duty diesel engine manufacturers will be implementing measures to reduce emissions beginning October 1, 2002, to meet the requirements of the Heavy-Duty Diesel Engine Settlement Agreements reached with the ARB. The Heavy-Duty Diesel Engine Settlements were agreements reached in response to lawsuits brought by the United States Environmental Protection Agency and violations alleged by the ARB pertaining to excess in-use emissions caused by the use of defeat devices and unacceptable algorithms. Navistar signed its Settlement Agreement on October 22, 1998. Cummins, Detroit Diesel Corporation, Caterpillar, Volvo, Mack and Renault signed their Settlement Agreements on December 15, 1998.

(3) Formaldehyde exhaust emissions from new 1993 and subsequent model methanol-fueled diesel engines, shall not exceed:

<i>Model Year</i>	<i>Formaldehyde (g/bhp-hr)</i>
1993-1995.....	0.10
1996 and subsequent.....	0.05

(4) An engine family whose design allows engine operation in either of two distinct alternative fueling modes, where each fueling mode is characterized by use of one fuel or a combination of two fuels and by significantly different emission levels under each mode, may certify to a different NOx or NOx plus NMHC (as applicable depending on model year) standard for each fueling mode, provided it meets the following requirements:

(A) The NOx or NOx plus NMHC certification standard used for operation under the higher emitting fueling mode must be one of the standards denoted by footnote H in paragraph (a)(1) and footnote E in paragraph (a)(2).

(B) The NOx or NOx plus NMHC certification standard used for operation under the lower emitting fueling mode must be one of the reduced-emission standards denoted by footnote I in paragraph (a)(1) and footnote F in paragraph (a)(2).

(C) The engine family is not used to participate in any manufacturer's averaging, banking or trading program.

(D) The engine family meets all other emission requirements contained in this section.

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(E) The higher emitting fueling mode must be intended only for fail-safe vehicle operation when a malfunction or inadvertent fuel depletion precludes operation in the lower emitting fueling mode, as evidenced by a significantly reduced horsepower versus engine speed curve when operating in the higher emitting fueling mode when compared to the similar curve for the lower emitting fueling mode.

(b) The test procedures for determining compliance with standards applicable to 1985 and subsequent heavy-duty diesel engines and vehicles and the requirements for participation in the averaging, banking and trading programs, are set forth in the "California Exhaust Emission Standards and Test Procedures for 1985 and Subsequent Model Heavy-Duty Diesel Engines and Vehicles" adopted April 8, 1985, as last amended November 22, 2000, which is incorporated herein by reference.

(c)(1) The exhaust emissions from (A) new 1987 through 2003 model heavy-duty Otto-cycle engines (except methanol-fueled engines and except heavy-duty Otto-cycle natural-gas-fueled and liquified-petroleum-gas-fueled Otto-cycle engines derived from diesel-cycle engines) and (B) from new 1993 through 2003 model heavy-duty methanol-fueled Otto-cycle engines (except in all cases engines used in medium-duty vehicles) shall not exceed:

##### Exhaust Emission Standards (grams per brake horsepower-hour)

<i>Model Year</i>	<i>Total Hydrocarbons or OMHCEA</i>	<i>Optional Non-methane Hydrocarbons<sup>A</sup></i>	<i>Carbon Monoxide<sup>B</sup></i>	<i>Oxides of Nitrogen</i>
1987C	1.1D		14.4D	10.6
	1.9E		37.1E	10.6
1988-1989	1.1D		14.4D	6.0
	1.9E		37.1E	6.0
1990	1.1	0.9D	14.4D	6.0
	1.9E	1.7E	37.1E	6.0
1991-1994	1.1D	0.9D	14.4D	5.0
	1.9E	1.7E	37.1E	5.0
1995-1997	1.9E	1.7E	37.1E	5.0
1995-1997	1.9E	1.7E	37.1	2.5 to 5.0F
1998-2003	1.9E	1.7E	37.1E	4.0
1998-2003	1.9E	1.7E	37.1E	1.5 to 0.5F

<sup>A</sup>The total or optional non-methane hydrocarbon standards apply to petroleum-fueled, natural-gas-fueled and liquefied-petroleum-gas-fueled engines. The Organic Material Hydrocarbon Equivalent, or OMHCE, standards apply to methanol-fueled engines.

<sup>B</sup>Carbon Monoxide emissions from engines utilizing exhaust after treatment technology shall also not exceed 0.5 percent of the exhaust gas flow at curb idle.

<sup>C</sup>Manufactures with existing heavy-duty Otto-cycle engines certified to the California 1986 steady-state emission standards and test procedures may as an option certify those engines, for the 1987 model year only, in accordance with the standards and test procedures for 1986 heavy-duty Otto-cycle engines established in Section 1956.7.

<sup>D</sup>These standards are applicable to Otto-cycle engines intended for use in all heavy-duty vehicles.

<sup>E</sup>Applicable to heavy-duty Otto-cycle engines intended for use only in vehicles with a gross vehicle weight rating greater than 14,000 pounds. Also, as an option, a manufacturer may certify one or more 1988 through 1994 model Otto-cycle heavy-duty engine configurations intended for use in all heavy-duty vehicles to these emission standards, provided that the total model-year sales of such configuration(s) being certified to these emission standards represent no more than 5 percent of total model-year sales of all Otto-cycle heavy-duty engines intended for use in vehicles with a Gross Vehicle Weight Rating of up to 14,000 pounds by the manufacturer.

<sup>F</sup>These are optional standards and apply to all heavy-duty engines intended for use only in vehicles with a gross vehicle weight greater than 14,000 pounds. A manufacturer may elect to certify to an optional standard between the values, inclusive, by 0.5 grams per brake horsepower-hour increments.

(2) Formaldehyde exhaust emissions from new 1993 and subsequent model methanol-fueled otto cycle engines shall not exceed:

<i>Model Year</i>	<i>Formaldehyde (g/bhp-hr)</i>
1993-1995.....	0.10
1996 and Subsequent.....	0.05

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(3) The exhaust emissions from new 2004 and subsequent model heavy-duty Otto-cycle engines shall not exceed<sup>A</sup>:

(a) Non-Methane Hydrocarbons plus Oxides of Nitrogen: 2.5 grams per brake horsepower-hour with non-methane hydrocarbons not to exceed 0.5 grams per brake horsepower-hour; or 2.4 grams per brake horsepower-hour;

(b) Carbon Monoxide: 37.1 grams per brake horsepower-hour.

<sup>A</sup>[The U.S. EPA is considering the adoption of amendments to the federal emission standards for heavy-duty Otto-cycle engines as they existed June 24, 1996. If the U.S. EPA promulgates amendments to the emission standards for this category, the ARB will hold a noticed public hearing within one year of such promulgation to consider the adoption of similar or identical standards in California.]

(d) The test procedures for determining compliance with standards applicable to 1987 and subsequent model heavy-duty otto-cycle engines and vehicles are set forth in the "California Exhaust Emission Standards and Test Procedures for 1987 and Subsequent Model Heavy-Duty Otto-Cycle Engines and Vehicles," adopted April 25, 1986, as last amended June 24, 1996, which is incorporated by reference herein.

(e) A manufacturer may elect to certify heavy-duty vehicles of 10,000 pounds or less maximum gross vehicle weight rating as medium-duty vehicles under section 1960.1 of this chapter, in which event the heavy-duty emission standards and test procedures in this section shall not apply.

(f)(1) In 1985 and future years, the executive officer may authorize use of engines certified to meet federal emission standards, or which are demonstrated to meet appropriate federal emission standards, in up to a total of 100 heavy-duty vehicles, including otto-cycle and diesel heavy-duty vehicles, in any one calendar year when the executive officer has determined that no engine certified to meet California emission standards exists which is suitable for use in the vehicles.

(2) In order to qualify for an exemption, the vehicle manufacturer shall submit, in writing, to the executive officer the justification for such exemption. The exemption request shall show that, due to circumstances beyond the control of the vehicle manufacturer, California certified engines are unavailable for use in the vehicle. The request shall further show that redesign or discontinuation of the vehicle will result in extreme cost penalties and disruption of business. In evaluating a request for an exemption, the executive officer shall consider all relevant factors, including the number of individual vehicles covered by the request and the anti-competitive effect, if any, of granting the request. If a request is denied, the executive officer shall state in writing the reasons for the denial.

(3) In the event the executive officer determines that an applicant may meet the criteria for an exemption under this subsection, but that granting the exemption will, together with previous exemptions granted, result in over 100 vehicles being permitted under this subsection to use non-California engines in heavy-duty vehicles in any one calendar year, the exemption may be granted only by the state board, under the criteria set forth herein.

(g) The exhaust emissions from new 1995 and subsequent model-year engines used in incomplete medium-duty vehicles or diesel engines used in medium-duty vehicles shall not exceed:

Exhaust Emission Standards<sup>A</sup>  
(grams per brake horsepower-hour)

<i>Model Year</i>	<i>Carbon Monoxide</i>	<i>Non-methane Hydrocarbon and Oxides of Nitrogen<sup>B</sup></i>	<i>Particulates<sup>C</sup></i>
1995 <sup>D</sup> and Subsequent	14.4	3.9	0.10

<sup>A</sup>This set of standards is optional. Manufacturers of engines used in incomplete medium-duty vehicles or diesel engines used in medium-duty vehicles from 8501-14,000 pounds, gross vehicle weight may choose to comply with these standards as a alternative to the primary emission standards and test procedures specified in section 1960.1, Title 13, California Code of Regulations. Manufacturers that choose to comply with these optional heavy-duty standards and test procedures shall specify, in the application for certification, an in-use compliance test procedure, as provided in section 2139(c), Title 13, California Code of Regulations.

<sup>B</sup>This standard is the sum of the individual non-methane hydrocarbon emissions and oxides of nitrogen emissions. For methanol-fueled engines, non-methane hydrocarbons shall mean organic material hydrocarbon equivalent.

<sup>C</sup>This standard shall only apply to diesel engines and vehicles.

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<sup>D</sup>In the 1995 model-year only, manufacturers may certify up to 50 percent of their medium-duty engines or vehicles to the applicable 1994 model-year standards and test procedures. For the 1995 through 1997 models, alternative in-use compliance is available for medium-duty manufacturers. A manufacturer may use alternative in-use compliance for up to 100 percent of its fleet in the 1995 and 1996 model years and up to 50 percent of its fleet in the 1997 model year. The percentages shall be determined from the manufacturers' projected California sales of medium-duty vehicles. For engines certified to the standards and test procedures of this subsection, "alternative in-use compliance" shall consist of an allowance of 25 percent over the HC + NOx standard. In-use compliance testing shall be limited to vehicles or engines with less than 90,000 miles.

(h) The exhaust emissions from new 1992 and subsequent model-year engines used in incomplete medium-duty low-emission vehicles, ultra-low-emission vehicles, and super-ultra-low-emission vehicles, and for diesel engines used in medium-duty low-emission vehicles, ultra-low-emission vehicles and super-ultra-low-emission vehicles shall not exceed:

**Exhaust Emission Standards for Engines Used in Incomplete Medium-Duty  
Low-Emission Vehicles, Ultra-Low-Emission Vehicles, and  
Super Ultra-Low-Emission Vehicles, and for Diesel  
Engines Used in Medium-Duty Low-Emission Vehicles, Ultra-Low-Emission  
Vehicles, and Super Ultra-Low-Emission Vehicles<sup>A,F</sup>  
(grams per brake horsepower-hour)**

<i>Model Year</i>	<i>Vehicle Emissions Category<sup>B</sup></i>	<i>Carbon Monoxide</i>	<i>Non-methane Hydrocarbon and Oxides of Nitrogen<sup>C</sup></i>	<i>Formaldehyde</i>	<i>Particulate Matter<sup>D</sup></i>
1992 <sup>E</sup> -2001	LEV	14.4	3.5 <sup>K</sup>	0.050	0.10 <sup>K</sup>
2002-2003 <sup>E</sup>	LEV	14.4	3.0 <sup>K</sup>	0.050	0.10 <sup>K</sup>
1992-2003 <sup>E,H</sup>	ULEV	14.4	2.5 <sup>K</sup>	0.050	0.10 <sup>K</sup>
2004 and subsequent	ULEV - Opt. A.	14.4	2.5G, <sup>I,J,K</sup>	0.050	0.10 <sup>J,K</sup>
2004 and subsequent	ULEV - Opt. B	14.4	2.4G, <sup>I,J,K</sup>	0.050	0.10 <sup>J,K</sup>
1992 and subsequent	SULEV	7.2	2.0 <sup>K</sup>	0.025	0.05 <sup>K</sup>

<sup>A</sup>This set of standards is optional. Manufacturers of engines used in incomplete medium-duty vehicles or diesel engines used in medium-duty vehicles from 8501-14,000 pounds gross vehicle weight rating may choose to comply with these standards as a alternative to the primary emission standards and test procedures specified in section 1960.1, or section 1961, Title 13, California Code of Regulations. Manufacturers that choose to comply with these optional heavy-duty standards and test procedures shall specify, in the application for certification, an in-use compliance test procedure, as provided in section 2139(c), Title 13, California Code of Regulations.

<sup>B</sup>"LEV" means low-emission vehicle.

"ULEV" means ultra-low-emission vehicle.

"SULEV" means super ultra-low-emission vehicle.

<sup>C</sup>This standard is the sum of the individual non-methane hydrocarbon emissions and oxides of nitrogen emissions. For methanol-fueled engines, non-methane hydrocarbons shall mean organic material hydrocarbon equivalent ("OMHCE").

<sup>D</sup>This standard shall only apply to diesel engines and vehicles.

<sup>E</sup>Manufacturers may certify engines used in incomplete medium-duty vehicles or diesel engines used in medium-duty vehicles to these standards to meet the requirements of section 1965.8 (g), Title 13, California Code of Regulations.

<sup>F</sup>In-use compliance testing shall be limited to vehicles or engines with fewer than 90,000 miles.

<sup>G</sup>[The U.S. EPA is considering the adoption of amendments to the federal emission standards for engines used in incomplete medium-duty vehicles or diesel engines used in medium-duty vehicles as they existed June 24, 1996. If the U.S. EPA promulgates amendments to the emission standards for this category, the ARB will hold a noticed public hearing within one year of such promulgation to consider the adoption of similar or identical standards in California.]

<sup>H</sup>For engines certified to the 3.5 grams per brake horsepower-hour (g/bhp-hr) LEV standards, the in-use compliance standard shall be 3.7 g/bhp-hr for the first two model years of introduction. For engines certified to the 2002 and 2003 model year LEV standards, the in-use compliance standard shall be 3.2 g/bhp-hr. For engines certified to the 1992 through 2003 model year ULEV standards, the in-use compliance standard shall be 2.7 g/bhp-hr for the first two model years of introduction. For engines certified to the 1992 and subsequent SULEV standards, the in-use compliance standard shall be 2.2 g/bhp-hr for the first two model years of introduction.

<sup>I</sup>Manufacturers have the option of certifying to either option A or B. Manufacturers electing to certify to Option A must demonstrate that the NMHC emissions do not exceed 0.5 g/bhp-hr.

<sup>J</sup>Emissions averaging may be used to meet these standards for diesel engines, using the requirements for participation in averaging, banking and trading programs, as set forth in the "California Exhaust Emission Standards and Test Procedures for 1985 and Subsequent Model

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Heavy-Duty Diesel Engines and Vehicles”, adopted April 8, 1985, as last amended November 22, 2000, incorporated by reference in paragraph (b), above.

<sup>k</sup>Engines of 1998 and subsequent model years may be eligible to generate averaging, banking and trading credits based on these standards according to the requirements of the averaging, banking and trading programs described in “California Exhaust Emission Standards and Test Procedures for 1985 and Subsequent Model Heavy-Duty Diesel Engines and Vehicles”, adopted April 8, 1985, as last amended November 22, 2000, incorporated by reference in paragraph (b), above.

NOTE: Authority cited: Sections 39600, 39601, 43013, 43018, 43101, 43103, 43104 and 43806, Health and Safety Code; and Section 28114, Vehicle Code. Reference: Sections 39002, 39003, 43000, 43013, 43018, 43100, 43101, 43101.5, 43102, 43103, 43104, 43106, 43204 and 43806, Health and Safety Code.

#### **REFERENCES**